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(54) **PRINTING SYSTEM FOR ENABLING OPTIMIZATION OF PRINTER OPERATION RATE, PRINTING CONTROL DEVICE, AND RECORDING MEDIUM FOR RECORDING PRINTING CONTROL PROGRAM**

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B41J 29/38 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 3/1215*** (2013.01); ***B41J 29/38*** (2013.01); ***G06F 3/122*** (2013.01); ***G06F 3/1247*** (2013.01); ***G06F 3/1267*** (2013.01); ***G06F 3/1282*** (2013.01); ***G06F 3/1285*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 3/1215; G06F 3/12; G06F 3/1285; G06F 3/1267; G06F 3/1247; G06F 3/1282; G06F 3/122; B41J 29/38
USPC 358/1.15
See application file for complete search history.

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(57) **ABSTRACT**

To provide a printing system, printing control device, and printing control program that can optimize the operating rate of a printer. An operation optimization processing part includes a comparison part and an output destination determination part, and performs a process that in order to the optimize the operating status of a printer, before an RIP process is performed, in accordance with a condition determined by the relationship between an RIP processing speed and a printing speed, for each print data, preliminarily determines a raster data output destination for temporarily storing raster data generated by performing the RIP process of the print data.

9 Claims, 7 Drawing Sheets

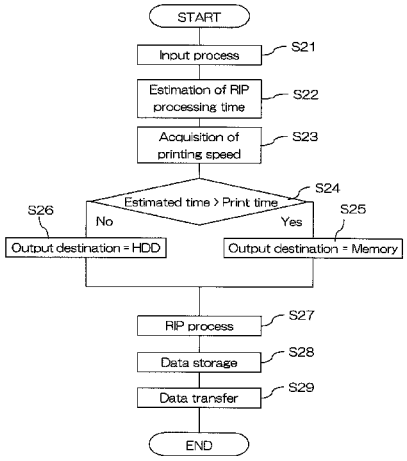

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FIG.1

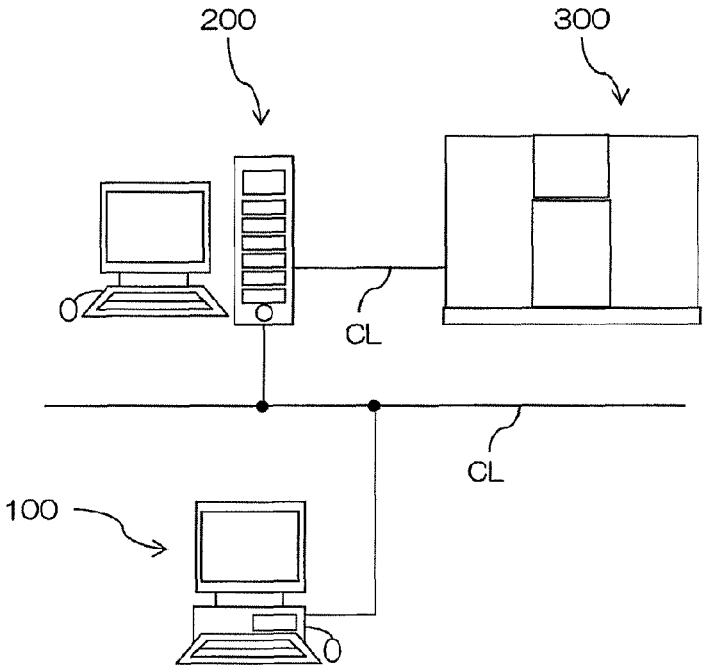


FIG.2

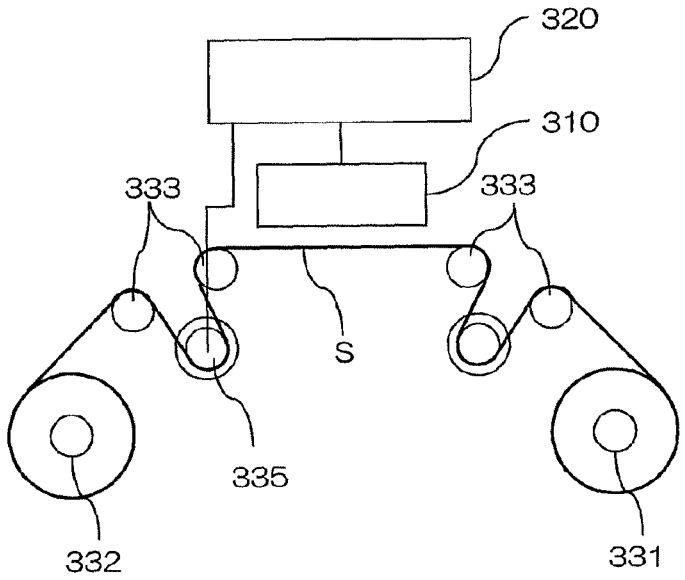


FIG.3

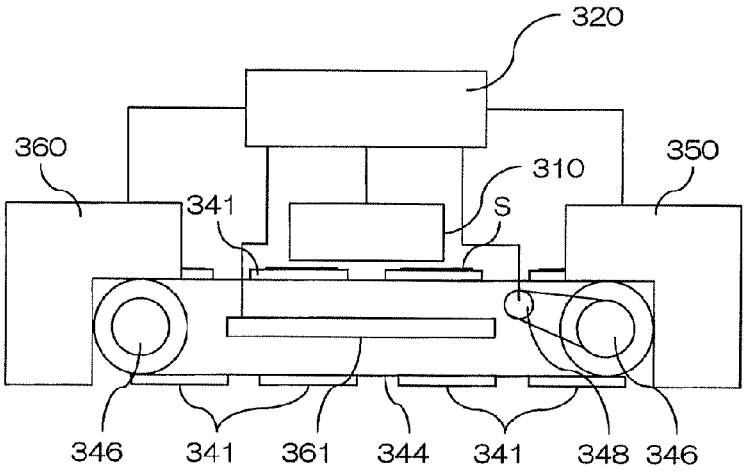
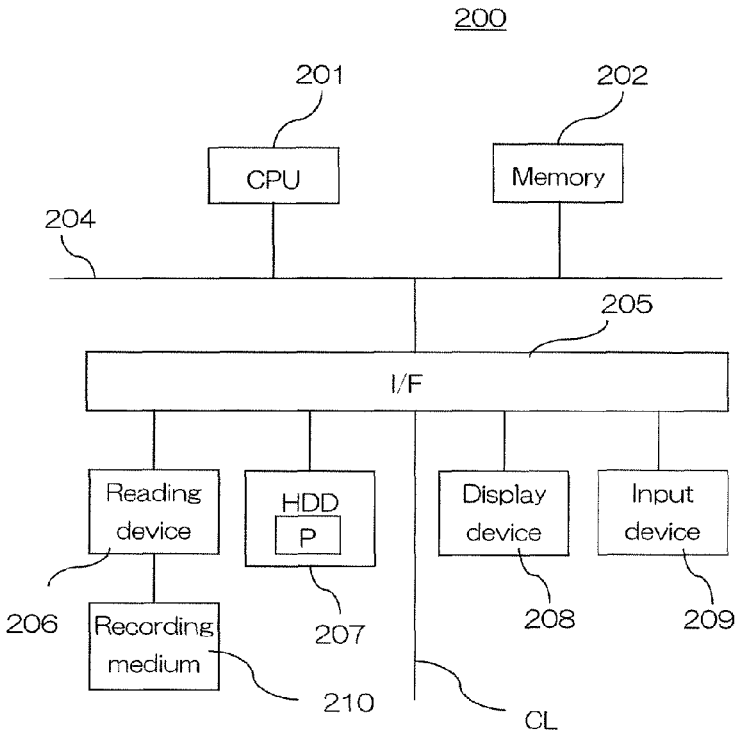


FIG.4


200
201
202
CPU
Memory
204
205
I/F
Reading device
HDD
P
Display device
Input device
206
Recording medium
207
208
209
210
CL

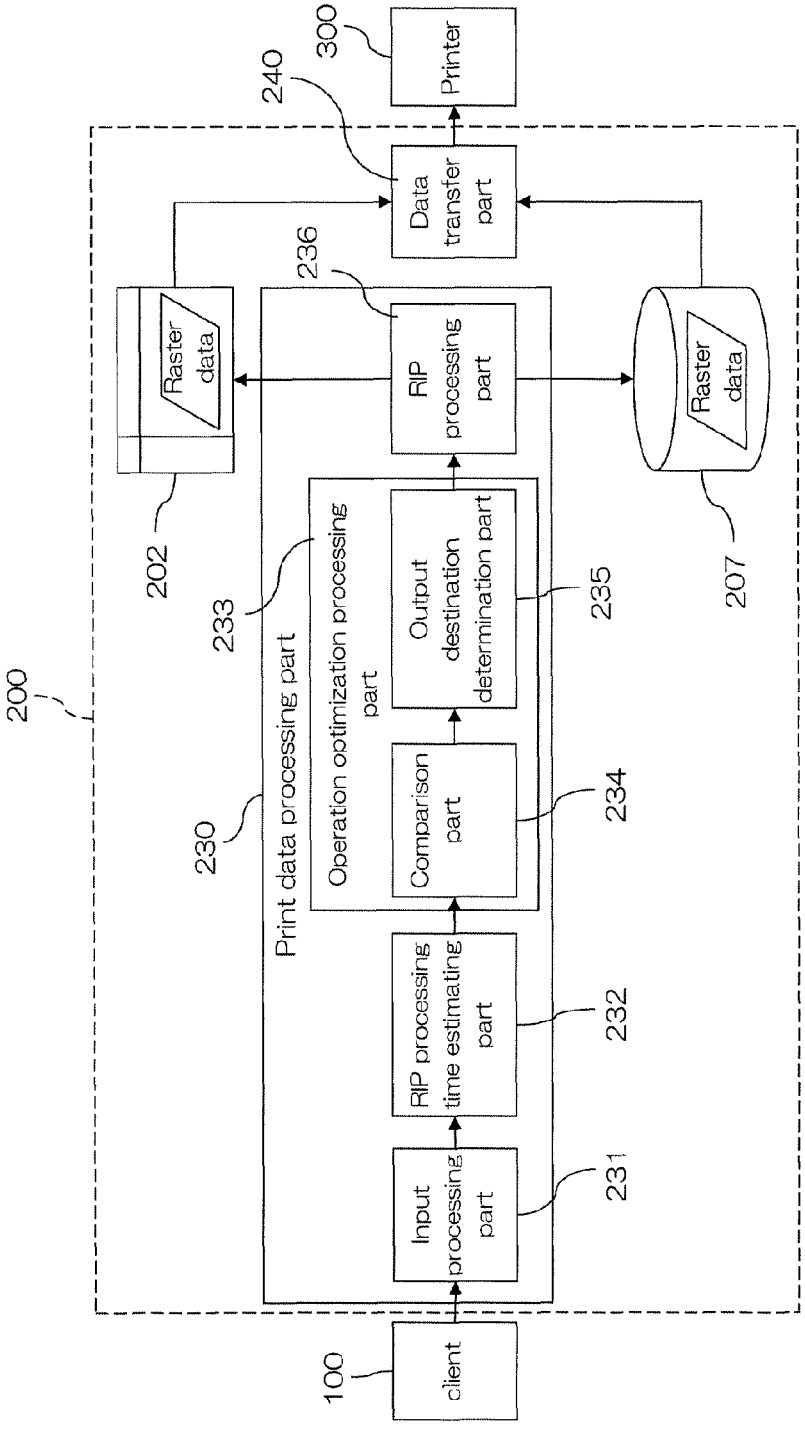
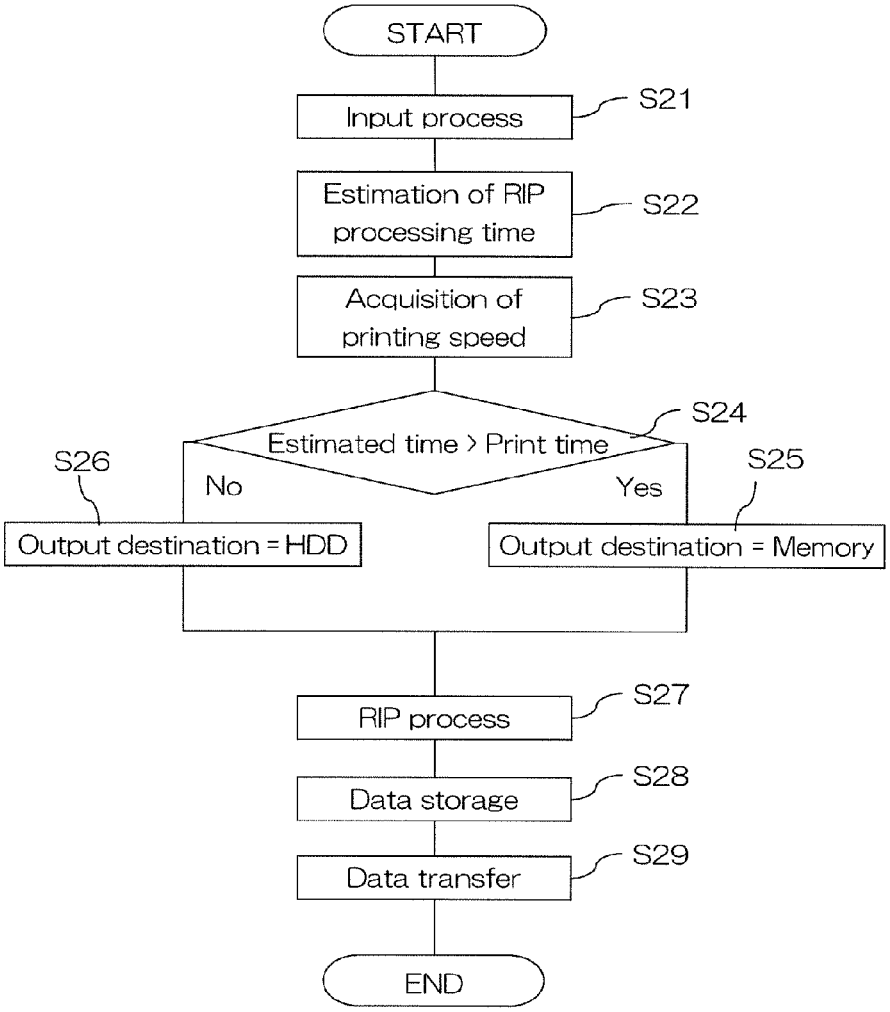

client
100
Input processing part
231
RIP processing time estimating part
232
Comparison part
234
Output destination determination part
235
Operation optimization processing part
233
Print data processing part
230
200
Raster data
202
RIP processing part
236
Raster data
207
Data transfer part
240
Printer
300

FIG.5

FIG.6


START
Input process
S21
Estimation of RIP processing time
S22
Acquisition of printing speed
S23
Estimated time > Print time
S24
No
Yes
S26
S25
Output destination = HDD
Output destination = Memory
RIP process
S27
Data storage
S28
Data transfer
S29
END

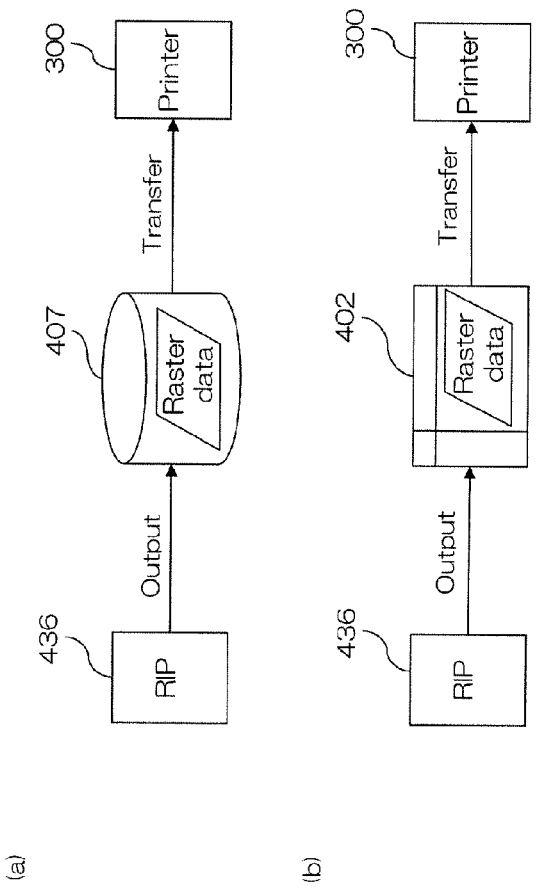

300
Printer
Transfer
407
Raster data
Output
436
RIP
(a)
300
Printer
Transfer
402
Raster data
Output
436
RIP
(b)

FIG.7

PRINTING SYSTEM FOR ENABLING OPTIMIZATION OF PRINTER OPERATION RATE, PRINTING CONTROL DEVICE, AND RECORDING MEDIUM FOR RECORDING PRINTING CONTROL PROGRAM

CROSS-REFERENCE TO RELATED APPLICATIONS

This Application is the U.S. National Phase of PCT/JP2013/074673 filed Sep. 12, 2013, which claims priority to Japanese Patent Application No. 2013-013024 filed Jan. 28, 2013. The subject matter of each is incorporated herein by reference in entirety.

TECHNICAL FIELD

The present invention relates to a printing system, printing control device, and printing control program.

BACKGROUND ART

There has been known a printing system that prints on a print medium by a digital printer or the like via an RIP (Raster Image Processor) process that converts print data, which describes a printer output image in a page description language, to raster data printable by the printer.

In such a printing system, the processing speed of the RIP process varies depending on an information amount of print data prepared for a print target by page. Also, in the case where the processing speed of the RIP process is lower than the printing speed of a printer side, "waiting time" occurs in the printer. When the "waiting time" occurs, the operation rate of the printer is reduced. For this reason, there is proposed a printing control device that estimates a RIP processing time to prepare an execution schedule for multiple print jobs on the basis of the estimated RIP processing time, and thereby efficiently schedules the print jobs to efficiently operate a printer (see Patent Literature 1).

FIG. **7** is a schematic diagram illustrating a raster data transfer operation from an RIP processing part **436** to a printer **300** in a printing control device of a conventional printing system. FIG. **7**(*a*) illustrates the case of writing raster data after the RIP process in a hard disk **407**, and then reading the raster data from the hard disk **407** to transfer the raster data to the printer **300**, whereas FIG. **7**(*b*) illustrates the case of temporarily storing raster data after the RIP process in a memory **402**, and then transferring the raster data to the printer **300**.

In the conventional printing system, the raster data generated by the RIP process is stored in the memory (main storage device) **402** of a personal computer, which functions as the printing control device, or written and stored in the hard disk (auxiliary storage device) **407**, and then transferred to the printer **300**. As illustrated in FIG. **7**(*a*), in the case of writing the raster data after the RIP process in the hard disk **407**, and then reading the raster data from the hard disk **407** to transfer the raster data to the printer **300**, a large amount of data can be stored in the hard disk **407**. On the other hand, as illustrated in FIG. **7**(*b*), in the case of temporarily storing the raster data after the RIP process in the memory **402**, and then transferring the raster data to the printer **300** (on-the-fly method), as compared with storing in the hard disk **407**, only a short data access time is required, and therefore a time from the RIP process to printing can be shortened.

CITATION LIST

Patent Literature

Patent Literature 1

Japanese Unexamined Patent Publication JP-A2002-182875

SUMMARY OF INVENTION

Technical Problem

As illustrated in FIG. **7**(*a*), in the case of storing the raster data after the RIP process in the hard disk **407**, and then transferring the raster data to the printer **300**, there is a problem that a data access time is longer than the on-the-fly method illustrated in FIG. **7**(*b*), and therefore if a processing speed of the RIP process is lower than a printing speed, a "waiting time" on the printer side becomes longer and the operating rate of the printer reduces.

On the other hand, as illustrated in FIG. **7**(*b*), in the case of temporarily storing the raster data after the RIP process in the memory **402**, and then transferring the raster data to the printer **300**, if the processing speed of the RIP process is higher than the printing speed, pieces of data waiting to be transferred to the printer **300** are accumulated in the memory **402**, thereby possibly causing a memory shortage. As a result, performance of the personal computer functioning as the print control device reduces.

The present invention is made in order to solve the above-described problems, and intends to provide a printing system, printing control device, and printing control program that can optimize the operating rate of a printer.

Solution to Problem

An invention according to a first aspect is a printing system including: a print data processing device that performs a conversion process of a print target described in a page description language to raster data; and a printer that on a basis of the raster data prepared by the print data processing device, executes printing on a recording medium, in which the print data processing device includes: processing time estimating means adapted to estimate a time necessary for the conversion process of the print target to the raster data; printing speed acquisition means adapted to acquire a printing speed at which the printer executes printing; first storage means adapted to electrically record the raster data with use of a semiconductor element, and second storage means adapted to magnetically record the raster data with use of a magnetic material, which are for, when the raster data is prepared by the conversion process, temporarily storing the raster data; determination means adapted to determine whether to, on a basis of the estimated time estimated by the processing time estimating means and the printing speed acquired from the printer, store the raster data prepared by the conversion process in the first storage means or in the second storage means; and transfer means adapted to, on a basis of the determination by the determination means, transfer the raster data stored in the first storage means or in the second storage means to the printer.

An invention according to a second aspect is the invention according to the first aspect, in which the printing speed is represented by a conveyance amount of the recording medium per unit time; and the determination means calculates a print time from a recording medium amount necessary to print the print target in the printer operating at the

printing speed, in a case where the estimated time is shorter than the print time, determines to store the raster data in the second storage means, and in a case where the estimated time is longer than the print time, determines to store the raster data in the first storage means.

An invention according to a third aspect is the invention according to the first aspect, in which the printing speed is represented by a conveyance amount of the recording medium per unit time; and the determination means calculates a conveyance amount of the recording medium conveyed during the estimated time in the printer operating at the printing speed, in a case where the conveyance amount of the recording medium is smaller than a recording medium amount necessary to print the print target in the printer, determines to store the raster data in the second storage means, and in a case where the conveyance amount of the recording medium is larger than the recording medium amount necessary to print the print target in the printer, determines to store the raster data in the first storage means.

An invention according to a fourth aspect is the invention according to any of the first to third aspects, in which the printer executes printing on a roll sheet in a plateless manner.

An invention according to a fifth aspect is the invention according to any of the first to third aspects, in which the printer executes printing on a sheet in a plateless manner.

An invention according to a sixth aspect is a printing control device that controls a printing system including: a print data processing device that performs a conversion process of a print target described in a page description language to raster data; and a printer that on a basis of the raster data prepared by the print data processing device, executes printing on a recording medium, and the printing control device includes: processing time estimating means adapted to estimate a time necessary for the conversion process of the print target to the raster data; printing speed acquisition means adapted to acquire a printing speed at which the printer executes printing; first storage means adapted to electrically record the raster data with use of a semiconductor element, and second storage means adapted to magnetically record the raster data with use of a magnetic material, which are for, when the raster data is prepared by the conversion process, temporarily storing the raster data; determination means adapted to determine whether to, on a basis of the estimated time estimated by the processing time estimating means and the printing speed acquired from the printer, store the raster data prepared in the first storage means or in the second storage means; and transfer means adapted to, on a basis of the determination by the determination means, transfer the raster data stored in the first storage means or in the second storage means to the printer.

An invention according to a seventh aspect is the invention according to the sixth aspect, in which the printing speed is represented by a conveyance amount of the recording medium per unit time; and the determination means calculates a print time of the print target in the printer operating at the printing speed, in a case where the estimated time is shorter than the print time, determines to store the raster data in the second storage means, and in a case where the estimated time is longer than the print time, determines to store the raster data in the first storage means.

An invention according to an eighth aspect is the invention according to the sixth aspect, in which the printing speed is represented by a conveyance amount of the recording medium per unit time; and the determination means calculates a conveyance amount of the recording medium conveyed during the estimated time in the printer operating at the printing speed, in a case where the conveyance amount of the recording medium is smaller than a recording medium amount necessary to print the print target in the printer, determines to store the raster data in the second storage means, and in a case where the conveyance amount of the recording medium is larger than the recording medium amount necessary to print the print target in the printer, determines to store the raster data in the first storage means.

An invention according to a ninth aspect is a printing control program executed by a CPU of a computer in a memory in order to make the computer function as a printing control device in a printing system including: a print data processing device that performs a conversion process of a print target described in a page description language to raster data; and a printer that on a basis of the raster data prepared by the print data processing device, executes printing on a recording medium, and the printing control program includes: a processing time estimating step of estimating a time necessary for the conversion process of the print target to the raster data; a printing speed acquisition step of acquiring a printing speed at which the printer executes printing; a determination step of determining whether to, on a basis of the estimated time estimated in the processing time estimating step and the printing speed acquired from the printer, store the raster data in first storage means adapted to use a semiconductor element to do electrical recording or in second storage means adapted to do magnetic recording;

a conversion processing step of converting the print target to the raster data; a storage step of, on a basis of the determination in the determination step, temporarily recording the raster data prepared in the conversion processing step in the first storage means or in the second storage means; and a transfer step of transferring the raster data stored in the first storage means or in the second storage means to the printer.

Advantageous Effects of Invention

According to the inventions according to the first to ninth aspects, an RIP processing estimated time estimated before the RIP process for each print target, and the print time are compared with each other to determine preliminarily before the RIP process which of the first storage means and the second storage means an output destination of raster data after the RIP process is set to, and in accordance with the determination, printing control that temporarily stores the raster data and performs a data transfer operation of the data to the printer is performed, so that the operating rate of the printer **300** can be optimized, and the operating status of the whole of the printing system can also be optimized.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a schematic diagram of a printing system.

FIG. **2** is a schematic diagram of a printer **300**.

FIG. **3** is a schematic diagram of another printer **300**.

FIG. **4** is a block diagram illustrating a hardware configuration of the controller **200**.

FIG. **5** is a block diagram illustrating a functional configuration of the controller **200**.

FIG. **6** is a flowchart illustrating a data processing procedure by the controller **200**.

FIG. **7** is a schematic diagram illustrating a raster data transfer operation from an RIP processing part **436** to a printer **300** in a printing control device of a conventional printing system.

DESCRIPTION OF EMBODIMENTS

In the following, embodiments of the present invention will be described on the basis of the drawings. FIG. **1** is a schematic diagram of a printing system.

This printing system includes: a printer **300** that executes printing on the basis of digital data; and a printing control device (hereinafter referred to as a "controller") **200** that functions as a print data processing device that performs an RIP process for converting print data to raster data processable by the printer **300**, as well as supplying the raster data to the printer **300**. The controller **200** and the printer **300** can mutually transceive various types of information via a communication line CL connected to a network such as an LAN (Local Area Network).

A client computer (hereinafter referred to as a "client") **100** is connected to the controller **200** via the communication line CL. The client **100** is one that edits and prepares a print target, edits characters and patterns constituting a print, and prepares print data described in a page description language such as a PDF (Portable Document Format). Also, instructions such as execution of printing and a pause can be issued to the printer **300** via input devices connected to the client **100**, such as a keyboard and a mouse.

FIGS. **2** and **3** are schematic diagrams of the printer **300**. The printer **300** is one that executes printing on a recording medium such as a print sheet on the basis of data inputted from the client **100** via the controller **200**.

The printer **300** illustrated in FIG. **2** is one that, in accordance with an inkjet method, records an image on a print sheet S in the form of a roll sheet that is wound on an unwinding roller **331**, a winding roller **332**, and multiple tension rollers **333**, and conveyed by the drive of a drive motor **335**. The printer **300** includes: a recording part **310** having multiple inkjet heads in which nozzles adapted to eject ink are arrayed; and a control part **320**. The control part **320** performs print control for ejecting ink from nozzles and drive control of the drive motor **335** on the basis of raster data after the RIP process inputted from the controller **200**.

On the other hand, the printer **300** illustrated in FIG. **3** is one that in accordance with the inkjet method, records an image on a print sheet S that is referred to as a sheet and sucked on each of multiple tables **341** moving along a circulating track. This printer **300** includes: a paper feeding part **350** that feeds a print sheet S to a table **341**; and a paper discharging part **360** that collects a printed print sheet S from a table **341**. Also, the printer **300** includes, as with the printer **300** illustrated in FIG. **2**, a recording part **310** having multiple inkjet heads in which nozzles adapted to eject ink are arrayed, and a control part **320**. A table **341** of the printer **300** is moved by a table conveyance mechanism including: an endless conveyance mechanism that is connected to a chain **344** wound on a pair of sprockets **346**, and moves the table **341** from the paper discharging part **360** toward the paper feeding part **350** by the drive of a drive sprocket **348** that is rotated by the drive of a motor; and a linear motor mechanism **361** that is for, when the table **341** passes below the recording part **310**, separating the table **341** from the endless conveyance mechanism to accurately move the table **341**. The control part **320** of the printer **300** performs: supply control of a print sheet S from the paper feeding part **350** to a table **341**; paper discharging control that collects a print sheet S from a table **341** to the paper discharging part **360**; print control that ejects ink from nozzles on the basis of raster data after the RIP process inputted from the controller **200**; and table conveyance control that controls the drive of the drive sprocket **348** and the operation of the linear motor mechanism **361**.

Although the each printer **300** illustrated in FIGS. **2** and **3** is one that records an image in accordance with the inkjet method, as a printing method of a printer in this printing system, for example, an electrophotographic method that as with the inkjet method, executes printing in a plateless manner can also be employed.

FIG. **4** is a block diagram illustrating a hardware configuration of the controller **200**.

The controller **200** is realized using a computer, and includes: a CPU **201**; a memory **202** that includes a ROM and a RAM and stores information using a semiconductor element; an interface **205**; a reading device **206** such as a disk drive that reads information stored in a portable recording medium **210** such as a CD-ROM; an HDD (hard disk) **207** that magnetically stores information using a magnetic material; a display device **208** such as a liquid crystal display; and an input device **209** including a keyboard, a mouse, and the like. The CPU **201**, memory **202**, and interface **205** are mutually connected via a bus **204**. The interface **205** is connected with the reading device **206**, HDD **207**, display device **208**, input device **209**, and communication line CL.

The controller **200** is adapted to be communicable with the client **100** and the printer **300** via the communication line CL connected to the interface **205**. The HDD **207** stores various types of data such as raster data after the RIP process, and programs. When executing a program stored in the HDD **207**, the program is loaded in the ROM of the memory **202**, and a function of the program is realized using the RAM and the CPU **201**. For example, the CPU **201** executes an RIP processing program, and thereby the controller **200** functions as an RIP processing device. Also, the display device **208** displays various types of information such as print job execution status, and the input device **209** is used for various types of input operations by an operator.

Note that the memory **202** corresponds to first storage means of this invention, and the HDD **207** corresponds to second storage means of this invention. Also, a print control program of this invention may be recorded in the portable recording medium **210** such as a CD-ROM. In the case where the print control program of this invention is recorded in the recording medium **210**, the controller **200** uses the reading device **206** to read the program P from the recording medium **210**, and records the program P in the HDD **207**. Further, when the print control program is executed, the program P is loaded in the ROM of the memory **202**, and a function of the program P is realized using the RAM and the CPU **201**.

FIG. **5** is a block diagram illustrating a functional configuration of the controller **200**.

The controller **200** includes: a print data processing part **230** that converts print data transmitted from the client **100** to raster data understandable by the printer **300**; and a data transfer part **240** that transfers raster data to the printer **300**.

The print data processing part **230** includes: an input processing part **231** that receives print data from the client **100**; an RIP processing time estimating part **232** that estimates an RIP processing time of each print data; an operation optimization processing part **233**; and an RIP processing part **236** that performs the RIP process.

The input processing part **231** receives print data sent from the client **100**, such as PDF, and analyzes the content of the print data, such as object information. Also, the RIP processing time estimating part **232** estimates an RIP pro-

cessing time of each print data on the basis of a result of the analysis by the input processing part **231**.

The operation optimization processing part **233** performs a process that in order to optimize the operational status of the printer **300**, before the RIP process is performed, in accordance with a condition determined by the relationship between an RIP processing speed and a printing speed, for each print data, preliminarily determines a raster data output destination for temporarily storing raster data generated by performing the RIP process of print data.

The operation optimization processing part **233** includes a comparison part **234** and an output destination determination part **235**, and functions as determination means in the present invention. The comparison part **234** acquires the printing speed (e.g., the number of print pages per minute) set on the printer **300** side, and compares an RIP process estimated time estimated by the RIP processing time estimating part **232**, and a print time obtained on the basis of the printing speed with each other. Further, the output destination determination part **235** makes an output destination determination that on the basis of a result of the comparison by the comparison part **234**, preliminarily determines whether to, when print data for which an RIP processing time is estimated by the RIP processing time estimating part **232** is subsequently subjected to the RIP process and converted to raster data, store the raster data in the memory **202** or in the HDD **207**. Note that the operation optimization processing part **233** acquires the printing speed in the comparison part **234**, and therefore also functions as printing speed acquisition means in the present invention.

Raster data generated in the RIP processing part **236** is outputted to any of the memory **202** and the HDD **207** on the basis of the determination by the output destination determination part **235**.

The data transfer part **240** reads raster data recorded in any of the memory **202** and the HDD **207** and transfers the raster data to the printer **300** in accordance with a print execution sequence.

FIG. **6** is a flowchart illustrating a data processing procedure by the controller **200**.

When print data is inputted from the client **100**, an input process is performed (Step S**21**). In the input process step, for example, in accordance with which ordinal number the print data received by the input processing part **231** corresponds to, input information on the print data is added to a schedule providing a print execution sequence, and the print data is analyzed. By analyzing the print data, drawing instructions (drawing operators) included in the print data, the number of instructions in each of the drawing operators, graphic size information, and the like can be acquired.

Then, an RIP processing time is estimated (Step S**22**). In Step S**22**, on the basis of the pieces of information acquired by the analytical operation of the print data in Step S**21**, the RIP processing time is estimated. The estimate of the RIP processing time (RT) can be calculated using, for example, the following expression (1).

$$RT=TS+TG \quad (1)$$

Here, TS represents the sum of times necessary to perform stroke operators among the drawing operators, and TG is the sum of times necessary to perform image operators among the drawing operators. By preparing a table in which a time necessary to process one of instructions in each of the drawing operators is experimentally obtained, the RIP processing time can be calculated with reference to the table. Note that a method for estimating the RIP processing time is not limited to this.

After the completion of the RIP processing time estimation, a printing speed of the printer **300** is acquired (Step S**23**). The printing speed is a printing speed that was preliminarily set in the printer **300** using the input device **209** of the controller **200**, or the like. After the acquisition of the printing speed, a print time necessary to print raster data for which the RIP processing time was estimated is calculated from the printing speed. Note that the printing speed is represented by a conveyance amount of the print sheet S per unit time. Accordingly, a recording medium amount in this invention refers to the number of print sheets S in the case of a sheet, and in the case of a roll sheet, the length of the print sheet S.

For example, in the case where the printer **300** is one that executes printing on the sheets illustrated in FIG. **3**, the printing speed is set as a conveyance amount of the print sheets S as sheets per unit time (the number of sheets per minute). In this case, the print time for one page of print target is obtained from the printing speed, and the calculated print time and the RIP processing estimated time are compared with each other (Step S**24**).

On the other hand, in the case where the printer **300** is one that executes printing on the roll sheet illustrated in FIG. **2**, the printing speed is set as a conveyance amount of the print sheet S as a roll sheet per unit time (meters per minute). In this case, it is only necessary that a time necessary to convey the roll sheet the length of the sheet corresponding to one page is calculated as the print time, and compared with the RIP processing estimated time.

In Step S**24**, in the case where it is determined that the RIP processing estimated time is longer than the print time, it is determined that the raster data obtained after performing the RIP process of the print data for which the RIP processing time was estimated is stored in the memory **202**. Then, the memory **202** is stored as the assignment of an output destination in relation to the pieces of information of the print data, such as the print execution sequence and page numbers (Step S**25**).

On the other hand, in Step S**24**, in the case where it is determined that the RIP processing estimated time is shorter than the print time, it is determined that the raster data obtained after performing the RIP process of the print data for which the RIP processing time was estimated is stored in the HDD **207**. Then, the HDD **207** is stored as the assignment of the output destination in relation to the pieces of information of the print data, such as the print execution sequence and page numbers (Step S**26**).

After an output destination of raster data after the RIP process has been assigned for each print data as a result of the comparison in Step S**24**, the RIP process is then performed (Step S**27**). Each raster data after the RIP process is outputted to and stored in any of the memory **202** and the HDD **207** determined as an output destination before the RIP process.

Each raster data temporarily stored in any of the memory **202** and the HDD **207** is read toward the data transfer part **240** from any of the memory **202** and the HDD **207** in accordance with the print execution sequence, and transferred to the printer **300** (Step S**29**).

The CPU **201** of the controller **200** performs a printing control program of this invention in the memory **202**, and thereby each of the above-described steps is realized.

In this embodiment, in the case where an RIP processing estimated time is longer than a print time, raster data is stored in the memory **202** having a shorter data access time than the HDD **207**, and thereby the raster data after the RIP process can be quickly transferred to the printer **300** to prevent an increase in "waiting time" of the printer **300**. On the other hand, in the case where an RIP processing estimated time is shorter than a print time, storing in the HDD

207 capable of storing a large amount of data although a data access time is longer than the memory 202 makes it possible to prevent the performance of the controller 200 from being reduced by the accumulation of pieces of raster data waiting for printing in the memory 202.

Note that in the above-described embodiment, in Step S24, the RIP processing estimated time and the print time are compared with each other; however, since the printing speed is set as the conveyance amount of the print sheet S, the amount of the print sheet S conveyable in the printer 300 operating at the set printing speed during the RIP processing estimated time, and the amount of the print sheet S necessary to print the raster data after the RIP process by the printer 300 may be obtained by calculation and compared with each other. In this case, in the case where the amount of the print sheet S necessary for actual printing is smaller than the amount of the print sheet S conveyable during the RIP processing estimated time, the RIP processing speed is smaller than the printing speed, and therefore it is determined that the raster data after the RIP process is stored in the memory 202. On the other hand, in the case where the amount of the print sheet S necessary for actual printing by the printer 300 is larger than the amount of the print sheet S conveyable during the RIP processing estimated time, the printing speed is smaller than the RIP processing speed, and therefore it is determined that the raster data after the RIP process is stored in the HDD 207.

As described, in this invention, an RIP processing estimated time for each print data estimated before the RIP process, and a print time are compared with each other to determine for each print data preliminarily before the RIP process which of the storage means having different access times an output destination of raster data after the RIP process is set to, and in accordance with the determination, the raster data is temporarily stored and subjected to a data transfer operation to the printer, so that the operating status of the whole of the printing system can be optimized while keeping the operating rate of the printer 300 at a high level.

REFERENCE SIGNS LIST

100 Client
200 Controller
201 CPU
202 Memory
204 Bus
205 Interface
206 Reading device
207 HDD
208 Display device
209 Input device
230 Print data processing part
231 Input processing part
232 RIP processing time estimating part
233 Operation optimization processing part
234 Comparison part
235 Output destination determination part
236 RIP processing part
240 Data transfer part
300 Printer
P Program

The invention claimed is:

1. A printing system comprising:
a printer, configured to receive raster data and execute printing;
a controller, connected to the printer and configured to receive print data from a client computer, comprising:
a memory;
a hard drive;
a processor, configured to:
estimate a time necessary for a conversion process of the print data to raster data;
acquire a printing speed at which the printer executes printing;
determine whether to, on a basis of the estimated time and the printing speed, store raster data prepared by the conversion process in the memory or in the hard drive, wherein the memory is selected to store the raster data if a print time to print the print data at the print speed is shorter than the estimated time, and the hard drive is selected to store the raster data if the print time is longer than the estimated time;
based on the determination, cause the memory or the hard drive to store the raster data prepared by the conversion process; and
cause the stored raster data to be transferred to the printer.

2. The printing system according to claim 1, wherein:
the printing speed is represented by a conveyance amount of a recording medium per unit time; and
the processor is configured to calculate the print time from a recording medium amount necessary to print the print data with the printer operating at the printing speed.

3. The printing system according to claim 1, wherein:
the printing speed is represented by a conveyance amount of a recording medium per unit time; and
wherein the processor is configured to determine whether the print time to print the print data at the print speed is longer or shorter than the estimated time by calculating a conveyance amount of the recording medium conveyed during the estimated time with the printer operating at the printing speed,
wherein, the print time is determined to be longer than the estimated time if the conveyance amount of the recording medium is smaller than a recording medium amount necessary to print the print data with the printer, and the print time is determined to be shorter than the estimated time if the conveyance amount of the recording medium is larger than the recording medium amount necessary to print the print data with the printer.

4. The printing system according to any of claims 1 to 3, wherein the printer executes printing on a roll sheet in a plateless manner.

5. The printing system according to any of claims 1 to 3, wherein the printer executes printing on a sheet in a plateless manner.

6. A controller, capable of being connected to a printer and to receive print data from a client computer, comprising:
a memory;
a hard drive;
a processor, configured to:
estimate a time necessary for a conversion process of the print data to raster data;
acquire a printing speed at which the printer executes printing;
determine whether to, on a basis of the estimated time and the printing speed, store raster data in the memory or in the hard drive, wherein the memory is selected to store the raster data if a print time to print the print data at the print speed is shorter than the estimated time, and the hard drive is selected to store the raster data if the print time is longer than the estimated time;

based on the determination, cause the memory or the hard drive to store the raster data prepared by the conversion process; and

cause the stored raster data to be transferred to the printer.

7. The printing control device according to claim **6**, wherein:

the printing speed is represented by a conveyance amount of a recording medium per unit time; and

the processor is configured to calculate the print time from a recording medium amount necessary to print the print data with the printer operating at the printing speed.

8. The printing control device according to claim **6**, wherein

the printing speed is represented by a conveyance amount of a recording medium per unit time; and

wherein the processor is configured to determine whether the print time to print the print data at the print speed is longer or shorter than the estimated time by calculating a conveyance amount of the recording medium conveyed during the estimated time with the printer operating at the printing speed,

wherein, the print time is determined to be longer than the estimated time if the conveyance amount of the recording medium is smaller than a recording medium amount necessary to print the print data with the printer, and the print time is determined to be shorter than the estimated time if the conveyance amount of the recording medium is larger than the recording medium amount necessary to print the print data in with the printer.

9. A non-transitory storage medium storing a computer-executable program for causing a processor to execute a printing control program, the printing control program comprising the steps of:

estimating a time necessary for a conversion process of print data to raster data;

acquiring a printing speed at which a printer executes printing;

determining whether to, on a basis of the estimated time and the printing speed, store raster data in a memory or in a hard drive, wherein the memory is selected to store the raster data if a print time to print the print data at the print speed is shorter than the estimated time, and the hard drive is selected to store the raster data if the print time is longer than the estimated time;

converting the print data to the raster data;

based on the determination, causing the memory or the hard drive to store the raster data prepared in the converting step; and

cause the stored raster data to be transferred to the printer.

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